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ABSTRACT

Standardized vocational education course titles and core contents for two courses in Mississippi are provided: machine tool operation/machine shop I and II. The first course contains the following units: (1) orientation; (2) shop safety; (3) shop math; (4) measuring tools and instruments; (5) hand and bench tools; (6) blueprint reading; (7) lathes; (8) lathe operations; (9) milling machines; and (10) milling operations. The second course contains the following units: (1) orientation; (2) shop safety; (3) layout; (4) advanced lathe operations; (5) advanced milling operations; (6) grinding machines; (7) grinding operations; (8) project construction; and (9) computerized numerical control. Each unit consists of these components: objectives, with core/essential objectives indicated; suggested instructional practices; list of suggested resources; list of evaluation and suggested minimum performance standards, with core/essential objectives indicated; and performance record, with core/essential objectives indicated. A checklist for each course combining all unit performance standards into a single list is included. (NLA)

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STANDARDIZED CURRICULUM

FOR

MACHINE TOOL OPERATION I/MACHINE SHOP I

MISSISSIPPI DEPARTMENT OF EDUCATION

OFFICE OF VOCATIONAL, TECHNICAL

AND ADULT EDUCATION

June 1989

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FOREWORD

This volume is intended to be used in the State of Mississippi as a mechanism for standardizing vocational education course titles and core contents. The need for standardization of curricula was triggered by provisions in the Educational Reform Act of 1982 which mandated:

-- elimination of nearly all currently existing curriculum requirements and development of new curriculum content that is "properly sequenced" and "coordinated";

-- steps to ensure that students master one level of course work before being advanced to the next level and that progression is properly sequenced;

-- a criterion-referenced, state-wide testing program that is built upon an identified set of "basic skills" keyed to student performance in grades 3, 5, 8, and 11;

-- revised graduation requirements that take into account student performance on the basic skills and also on a test of "functional literacy skills"; and

-- a system of accrediting schools that takes into account the performance of districts, schools, and students.

In addition to the mandates of the Educational Reform Act, the Strategic Plan for Vocational and Technical Education in Mississippi also calls for improving the quality of vocational and technical education through the standardization of curricula and the articulation of secondary and postsecondary programs.

Both of these mandates were further reinforced by legislation passed in 1986 which called for the establishment of state-wide "guidelines and procedures for managing an instructional program in the public schools." This legislation calls for instructional management plans containing the following components:

1. a written list of learning objectives for every course for which academic credit is given on students' transcripts (state specified core objectives must be included);

2. <u>suggested</u> instructional practices and resources for the learning objectives;

3. standards for student performance for each learning objective; and

4. systematic procedures for evaluating student performance on the learning objectives.

Specific local district actions regarding the state-wide instructional management plan are also required, namely:

1. The objectives contained in this document are common to all programs in the state. Core objectives are designated with an asterisk. The local district is encouraged to add additional objectives to this listing to meet local needs of students and employers.

2. The local school board must officially adopt the learning objectives as the district's curricula.

3. Pass/fail policies must be based on mastery of learning objectives.

4. Student performance on the learning objectives must be systematically evaluated at least once during the school year.

5. During the school year, records of individual student performance must indicate whether or not the objectives have been mastered. The record must indicate mastery status for each of the objectives tested in the Basic Skills Assessment Program (including functional literacy skills) and must be permanently maintained on all students who do <u>not</u> master the basic and functional literacy skills prior to being tested on them.

6. Each year, information about student performance on learning objectives must be reviewed. Those objectives which students are not mastering must be identified, and a plan must be developed for improving student performance on those objectives.

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MACHINE TOOL OPERATION I/MACHINE SHOP I

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MACHINE TOOL OPERATION I/MACHINE SHOP I

Unit No.	Title
1	Orientation
2	Shop Safety
3	Shop Math
4	Measuring Tools and Instruments
5	Hand and Bench Tools
6	Blueprint Reading
7	Lathes
8	Lathe Operations
9	Milling Machines
10	Milling Operations

COURSE: Machine Tool Operation I/Machine Shop I

Unit 1: Orientation

Objectives: Upon completion of this unit, the student will:

1. Identify local school rules, policies, and operational procedures associated with machine tool operation programs.

*Indicates core/essential objectives

Suggested Instructional Practices:

Lecture-discussion

Suggested Resources:

Primary Resource: Local School District Student Handbook

Evaluation and Suggested Minimum Performance Standards:

Objective 1: The student will identify various rules, policies, and operational procedures as determined by local school district policy.

*Indicates core/essential objectives

Performance Record: Place a check by each objective the student achieved:

____ 1. Identified local school rules, policies, and operational procedures associated with machine tool operation programs.

*Indicates core/essential objectives

COURSE: Machine Tool Operation I/Machine Shop I

Unit 2: Shop Safety

Objectives: Upon completion of this unit, the student will:

*1. Identify rules of general and personal shop safety.

*Indicates core/essential objectives

Suggested Instructional Practices:

Lecture-discussion

Suggested Resources:

Primary Resource: Dunn, James. Machine Shop I. Stillwater, OK: Oklahoma State Department of Vocational and Technical Education. 1981.

Evaluation and Suggested Minimum Performance Standards:

*Objective 1: The student will identify 15 rules related to general shop safety and personal safety.

*Indicates core/essential objectives

Performance Record: Place a check by each objective the student achieved:

____ *1. Identified rules of general and personal shop safety.

*Indicates core/essential objectives

COURSE: Machine Tool Operation I/Machine Shop I

Unit 3: Shop Math

Objectives: Upon completion of this unit, the student will:

*1. Perform mathematical operations using fractions.
*2. Perform mathematical operations using decimal numbers.

*Indicates core/essential objectives

Suggested Instructional Practices:

Lecture-discussion

Suggested Resources:

Primary Resource: Dunn, James. Machine Shop I. Stillwater, OK: Oklahoma State Department of Vocational and Technical Education. 1981.

Evaluation and Suggested Minimum Performance Standards:

*Objective 1: The student will be able to convert fractions to a least common denominator; add, subtract, multiply, and divide using fractions; and convert fractional numbers to decimal numbers by completing a student assignment with 100 percent accuracy.
*Objective 2: The student will be able to add, subtract, multiply, and divide decimal numbers with 100 percent accuracy.

*Indicates core/essential objectives

Performance Record: Place a check by each objective the student achieved:

___ *1. Performed mathematical operations using fractions.
___ *2. Performed mathematical operations using decimal numbers.

*Indicates core/essential objectives

COURSE: Machine Tool Operation I/Machine Shop I

Unit 4: Measuring Tools and Instruments

Objectives: Upon completion of this unit, the student will:

*1. Read a rule.
*2. Identify common types of micrometers and their uses.
3. State rules for use and care of micrometers.
*4. Make and read a measurement with a micrometer.
*5. Make and read a measurement with a vernier caliper.
6. State rules for use and care of dial indicators.
7. Use a dial indicator to align a vise with swivel base.
*8. Use a dial indicator to align work in a 4-jaw chuck.

*Indicates core/essential objectives

Suggested Instructional Practices:

Lecture-discussion
Laboratory demonstration and practice

Suggested Resources:

Primary Resource: Dunn, James. Machine Shop I. Stillwater, OK: Oklahoma State Department of Vocational and Technical Education. 1981.

Evaluation and Suggested Minimum Performance Standards:

*Objective 1: The student will read a rule to the nearest 1/32nd inch.
*Objective 2: The student will identify three common types of micrometers and state their use.
Objective 3: The student will state six rules for proper care and use of a micrometer.
*Objective 4: The student will measure stock with a micrometer to within .001 inch.
*Objective 5: The student will measure stock with a vernier caliper to within .001 inch.
Objective 6: The student will state six rules applying to the care and use of a dial indicator.
Objective 7: The student will use a dial indicator to align a vise with swivel base to specifications.
*Objective 8: The student will use a dial indicator to align work in a 4-jaw chuck to specifications.

*Indicates core/essential objectives

Performance Record: Place a check by each objective the student achieved:

____ *1. Read a rule.
____ *2. Identified common types of micrometers and their uses.
____ 3. Stated rules for use and care of micrometers.
____ *4. Made and read a measurement with a micrometer.
____ *5. Made and read a measurement with a vernier caliper.
____ 6. Stated rules for use and care of dial indicators.
____ 7. Used a dial indicator to align a vise with swivel base.
____ *8. Used a dial indicator to align work in a 4-jaw chuck.

*Indicates core/essential objectives

COURSE: Machine Tool Operation I/Machine Shop I

Unit 5: Hand and Bench Tools

Objectives: Upon completion of this unit, the student will:

*1. Identify general hand tools associated with machine tool operation.
*2. State rules which apply to the safe use of hand tools.
*3. Determine the tap drill size using a chart or a formula.
*4. Produce internal threads by hand tapping.
*5. Produce external threads with a hand die.
*6. State rules which apply to safe use of a pedestal grinder.
*7. Check a grinding wheel for cracks.
*8. Dress a grinding wheel.
*9. Grind a high speed tool bit.
10. Identify the types of power saws used in machine tool operations.
*11. State rules for safe use of power saws.
12. List factors that determine blade selection.
*13. Cut stock with a horizontal band saw.
*14. Cut stock with a vertical band saw.
15. Identify the different types of drill presses.
*16. Identify operations performed on a drill press.
*17. List rules for safe use of drill presses.
*18. List factors that determine cutting speeds for drilling.
*19. Drill and ream holes to layout.

*Indicates core/essential objectives

Suggested Instructional Practices:

Lecture-discussion
Laboratory demonstration and practice

Suggested Resources:

Primary Resource: Dunn, James. Machine Shop I. Stillwater, OK: Oklahoma State Department of Vocational and Technical Education. 1981.

Evaluation and Suggested Minimum Performance Standards:

*Objective 1: The student will identify general hand tools associated with machine tool operation including the following: clamps and vises; pliers; wrenches; rules; calipers; hammers; screwdrivers; taps, dies, and accessories; pinches and chisels; and files and accessories.

*Objective 2: The student will state two rules which apply to the safe use of each of the following hand tools: bench vise, wrenches, pliers, files, screwdrivers, hand hacksaws, and hammers.

*Objective 3: The student will determine the proper size of tap drill for a given size tap, using a chart or a formula.

*Objective 4: The student will bore a hole and produce internal threads by hand tapping to specifications.

*Objective 5: The student will produce external threads to specifications with a hand die.

*Objective 6: The student will state 12 rules which apply to safe use of a pedestal grinder.

*Objective 7: The student will check a grinding wheel for cracks using the "ring" test.

*Objective 8: The student will dress a grinding wheel to a smooth sharp face.

*Objective 9: The student will grind a high speed tool bit to specifications.

Objective 10: The student will identify three types of power saws used in machine tool operations.

*Objective 11: The student will state 12 rules for safe use of power saws.

Objective 12: The student will list three factors that determine blade selection.

*Objective 13: The student will cut stock with a horizontal band saw to specifications following industry accepted procedures.

*Objective 14: The student will cut stock with a vertical band saw to specifications following industry accepted procedures.

Objective 15: The student will identify five different types of drill presses.

*Objective 16: The student will identify seven operations performed on a drill press.

*Objective 17: The student will list 15 rules for safe use of drill presses.

*Objective 18: The student will list three factors that determine cutting speeds for drilling.

*Objective 19: The student will drill and ream holes to layout specifications and tolerances.

*Indicates core/essential objectives

Performance Record: Place a check by each objective the student achieved:

____ *1. Identified general hand tools associated with machine tool operation.
____ *2. Stated rules which apply to the safe use of hand tools.
____ *3. Determined the tap drill size using a chart or a formula.

____ *4. Produced internal threads by hand tapping.
____ *5. Produced external threads with a hand die.
____ *6. Stated rules which apply to safe use of a pedestal grinder.
____ *7. Checked a grinding wheel for cracks.
____ *8. Dressed a grinding wheel.
____ *9. Ground a high speed tool bit.
____ 10. Identified the types of power saws used in machine tool operations.
____*11. Stated rules for safe use of power saws.
____ 12. Listed factors that determine blade selection.
____*13. Cut stock with a horizontal band saw.
____*14. Cut stock with a vertical band saw.
____ 15. Identified the different types of drill presses.
____*16. Identified operations performed on a drill press.
____*17. Listed rules for safe use of drill presses.
____*18. Listed factors that determine cutting speeds for drilling.
____*19. Drilled and reamed holes to layout.

*Indicates core/essential objectives

COURSE: Machine Tool Operation I/Machine Shop I

Unit 6: Blueprint Reading

Objectives: Upon completion of this unit, the student will:

*1. Identify symbols used on blueprints.
*2. Identify abbreviations used on blueprints.
*3. Identify the alphabet of lines.
*4. Define dimension and tolerance.
5. List types of information found in a blueprint title block.
*6. Read an industrial blueprint.

*Indicates core/essential objectives

Suggested Instructional Practices:

Lecture-discussion
Laboratory demonstration and practice

Suggested Resources:

Primary Resource: Dunn, James. Machine Shop I. Stillwater, OK: Oklahoma State Department of Vocational and Technical Education. 1981.

Evaluation and Suggested Minimum Performance Standards:

*Objective 1: The student will identify the following symbols used on blueprints: true position (center marks), center line, surface finish.
*Objective 2: The student will identify the following abbreviations used on industrial blueprints: CI, CRS, CB, CSK, DIA, FAO, ID, OD, No, R, TYP, UNC, UNF, NTP.
*Objective 3: The student will identify seven lines used in the alphabet of lines.
*Objective 4: The student will define dimension and tolerance as used on blueprints in machine tool operations.
Objective 5: The student will list seven types of information found in a blueprint title block.
*Objective 6: The student will read an industrial blueprint and complete answers to an assignment sheet based upon the blueprint with 100% accuracy.

*Indicates core/essential objectives

Performance Record: Place a check by each objective the student achieved:

____ *1. Identified symbols used on blueprints.
____ *2. Identified abbreviations used on blueprints.
____ *3. Identified the alphabet of lines.
____ *4. Defined dimension and tolerance.
____ 5. Listed types of information found in a blueprint title block.
____ *6. Read an industrial blueprint.

*Indicates core/essential objectives

COURSE: Machine Tool Operation I/Machine Shop I

Unit 7: Lathes

Objectives: Upon completion of this unit, the student will:

*1. Identify major parts and sub-parts of an engine lathe.
*2. List rules for safe use of the engine lathe.
*3. List rules for the care and cleaning of the engine lathe.
*4. Describe basic lathe operations.
*5. Free-hand grind a turning tool.
*6. Free-hand grind a facing tool.
*7. Set up a lathe and operate lathe controls.

*Indicates core/essential objectives

Suggested Instructional Practices:

Lecture-discussion
Laboratory demonstration and practice

Suggested Resources:

Primary Resource: Dunn, James. Machine Shop Lathes. Stillwater, OK: Oklahoma State Department of Education. 1983.

Evaluation and Suggested Minimum Performance Standards:

*Objective 1: The student will identify the four major parts of an engine lathe and 23 sub-parts of an engine lathe.
*Objective 2: The student will list 10 rules for safe use of the engine lathe.
*Objective 3: The student will list six rules for the care and cleaning of the engine lathe.
*Objective 4: The student will describe 12 basic lathe operations.
*Objective 5: The student will free-hand grind a turning tool to instructor specifications.
*Objective 6: The student will free-hand grind a facing tool to instructor specifications.
*Objective 7: The student will set up a lathe and operate lathe controls following manufacturer's specifications and procedures.

*Indicates core/essential objectives

Performance Record: Place a check by each objective the student achieved:

____ *1. Identified major parts and sub-parts of an engine lathe.
____ *2. Listed rules for safe use of the engine lathe.
____ *3. Listed rules for the care and cleaning of the engine lathe.
____ *4. Described basic lathe operations.
____ *5. Free-hand ground a turning tool.
____ *6. Free-hand ground a facing tool.
____ *7. Set up a lathe and operated lathe controls.

*Indicates core/essential objectives

COURSE: Machine Tool Operation I/Machine Shop I

Unit 8: Lathe Operations

Objectives: Upon completion of this unit, the student will:

*1. Remove and install a lathe chuck.
*2. Perform a facing operation.
*3. Face a part to length.
*4. Perform a straight turning operation.
*5. Use a dial indicator to align a 4-jaw chuck.
*6. Perform chamfer operations.
*7. Perform a center drilling operation.
*8. Perform a knurling operation.
*9. Perform a cutoff operation.

*Indicates core/essential objectives

Suggested Instructional Practices:

Lecture-discussion
Laboratory demonstration and practice

Suggested Resources:

Primary Resource: Dunn, James. Machine Shop Lathes. Stillwater, OK: Oklahoma State Department of Education. 1983.

Evaluation and Suggested Minimum Performance Standards:

*Objective 1: The student will remove and install a lathe chuck following manufacturer's recommended procedures.
*Objective 2: The student will perform a facing operation to specifications and tolerances.
*Objective 3: The student will face a part to a specified length and tolerance.
*Objective 4: The student will perform a straight turning operation to specifications and tolerances.
*Objective 5: The student will use a dial indicator to align a 4-jaw chuck to specifications and tolerances.
*Objective 6: The student will perform chamfer operations to specifications and tolerances.
*Objective 7: The student will perform a center drilling operation to specifications and tolerances.
*Objective 8: The student will perform a knurling operation to specifications and tolerances.

*Objective 9: The student will perform a cutoff operation to specifications and tolerances.

*Indicates core/essential objectives

Performance Record: Place a check by each objective the student achieved:

____ *1. Removed and installed a lathe chuck.
____ *2. Performed a facing operation.
____ *3. Faced a part to length.
____ *4. Performed a straight turning operation.
____ *5. Used a dial indicator to align a 4-jaw chuck.
____ *6. Performed chamfer operations.
____ *7. Performed a center drilling operation.
____ *8. Performed a knurling operation.
____ *9. Performed a cutoff operation.

*Indicates core/essential objectives

COURSE: Machine Tool Operation I/Machine Shop I

Unit 9: Milling Machines

Objectives: Upon completion of this unit, the student will:

*1. Identify different types of milling machines.
*2. Identify major parts of a vertical mill.
*3. Identify cutting tools used on vertical milling machines.
*4. State rules for milling machine safety.
*5. Clean and lubricate a vertical mill.

*Indicates core/essential objectives

Suggested Instructional Practices:

Lecture-discussion
Laboratory demonstration and practice

Suggested Resources:

Primary Resource: Dunn, James. Machine Shop Milling Machines. Stillwater, OK: Oklahoma State Board of Vocational and Technical Education. 1983.

Evaluation and Suggested Minimum Performance Standards:

*Objective 1: The student will identify four different types of milling machines.
*Objective 2: The student will identify ten major parts of a vertical mill.
*Objective 3: The student will identify the following cutting tools commonly used on vertical milling machines: double end two-flute end mill, four flute end mill, center drill.
*Objective 4: The student will state 15 rules for milling machine safety.
*Objective 5: The student will clean and lubricate a vertical mill following manufacturer's recommendations and specifications.

*Indicates core/essential objectives

Performance Record: Place a check by each objective the student achieved:

____ *1. Identified different types of milling machines.
____ *2. Identified major parts of a vertical mill.
____ *3. Identified cutting tools used on vertical milling machines.
____ *4. Stated rules for milling machine safety.
____ *5. Cleaned and lubricated a vertical mill.

*Indicates core/essential objectives

COURSE: Machine Tool Operation I/Machine Shop I

Unit 10: Milling Machine Operations

Objectives: Upon completion of this unit, the student will:

*1. Identify vertical milling machine operations.
*2. Set up a vertical milling machine.
*3. Perform a side milling operation.
*4. Perform an end milling operation.
*5. Perform a fly cut operation.

*Indicates core/essential objectives

Suggested Instructional Practices:

Lecture-discussion
Laboratory demonstration and practice

Suggested Resources:

Primary Resource: Dunn, James. Machine Shop Milling Machines. Stillwater, OK: Oklahoma State Board of Vocational and Technical Education. 1983.

Evaluation and Suggested Minimum Performance Standards:

*Objective 1: The student will identify eight common vertical milling machine operations.
*Objective 2: The student will set up a milling machine for operation by mounting cutters and cutter holders, mounting and aligning a swivel vise, and aligning the head square to the table.
*Objective 3: The student will perform a side milling operation to specifications and tolerances provided by the instructor.
*Objective 4: The student will perform an end milling operation to specifications and tolerances provided by the instructor.
*Objective 5: The student will perform a fly cut operation to specifications and tolerances provided by the instructor.

*Indicates core/essential objectives

Performance Record: Place a check by each objective the student achieved:

____ *1. Identified vertical milling machine operations.
____ *2. Set up a vertical milling machine.
____ *3. Performed a side milling operation.
____ *4. Performed an end milling operation.
____ *5. Performed a fly cut operation.

*Indicates core/essential objectives

MACHINE TOOL OPERATION II/MACHINE SHOP II

Developed by

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MACHINE TOOL OPERATION II/MACHINE SHOP II

Unit No.	Title
1	Orientation
2	Shop Safety (Review and Reinforcement)
3	Layout
4	Advanced Lathe Operations
5	Advanced Milling Operations
6	Grinding Machines
7	Grinding Operations
8	Project Construction
9	Computerized Numerical Control

COURSE: Machine Tool Operation II/Machine Shop II

Unit 1: Orientation

Objectives: Upon completion of this unit, the student will:

1. Identify local school rules, policies, and operational procedures associated with machine tool operation programs.

*Indicates essential/core objectives

Suggested Instructional Practices:

Lecture-discussion
Laboratory demonstration and practice

Suggested Resources:

Primary Resource: Local School District Student Handbook

Evaluation and Suggested Minimum Performance Standards:

Objective 1: The student will identify local school rules, policies, and operational procedures associated with machine tool operation programs as determined by the local school.

*Indicates core/essential objectives

Performance Record: Place a check by each objective the student achieved:

____ 1. Identified local school rules, policies, and operational procedures associated with machine tool operation programs.

*Indicates core/essential objectives

COURSE: Machine Tool Operation II/Machine Shop II

Unit 2: Shop Safety (Review and Reinforcement)

Objectives: Upon completion of this unit, the student will:

*1. Identify rules of general and personal shop safety.

*Indicates core/essential objectives

Suggested Instructional Practices:

Lecture-discussion
Laboratory demonstration and practice

Suggested Resources:

Primary Resource: Dunn, James. Machine Shop I. Stillwater, OK: Oklahoma State Department of Vocational and Technical Education. 1981.

Evaluation and Suggested Minimum Performance Standards:

*Objective 1: The student will identify 15 rules related to general shop safety and personal safety.

*Indicates core/essential objectives

Performance Record: Place a check by each objective the student achieved:

____ *1. Identified rules of general and personal shop safety.

*Indicates core/essential objectives

COURSE: Machine Tool Operation II/Machine Shop II

Unit 3: Layout

Objectives: Upon completion of this unit, the student will:

*1. Identify tools and instruments used in layout.
*2. Perform a layout job.

*Indicates core/essential objectives

Suggested Instructional Practices:

Lecture-discussion
Laboratory demonstration and practice

Suggested Resources:

Primary Resource: Dunn, James. Machine Shop I. Stillwater, OK: Oklahoma State Department of Vocational and Technical Education. 1981.

Evaluation and Suggested Minimum Performance Standards:

*Objective 1: The student will identify the following tools and instruments used in layout: hermaphrodite caliper, steel rule, inside calipers, dividers, vernier height gauge, protractor, combination square set, scribe.
*Objective 2: The student will perform a layout job for a small C-clamp to specifications and tolerances.

*Indicates core/essential objectives

Performance Record: Place a check by each objective the student achieved:

____ *1. Identified tools and instruments used in layout.
____ *2. Performed a layout job.

*Indicates core/essential objectives

COURSE: Machine Tool Operation II/Machine Shop II

Unit 4: Advanced Lathe Operations

Objectives: Upon completion of this unit, the student will:

*1. Turn between centers.
*2. Turn a taper.
*3. Perform a boring operation.
*4. Cut external threads.
*5. Pick up threads.
*6. Cut internal threads.
*7. Tap a blind hole.

*Indicates core/essential objectives

Suggested Instructional Practices:

Lecture-discussion
Laboratory demonstration and practice

Suggested Resources:

Primary Resource: Dunn, James. Machine Shop Lathes. Stillwater, OK: Oklahoma State Department of Vocational and Technical Education. 1983.

Evaluation and Suggested Minimum Performance Standards:

*Objective 1: The student will turn between centers to specifications and tolerances provided by the instructor.
*Objective 2: The student will turn a taper to specifications and tolerances provided by the instructor.
*Objective 3: The student will perform a boring operation to specifications and tolerances provided by the instructor.
*Objective 4: The student will cut external threads to specifications.
*Objective 5: The student will pick up threads as per specifications.
*Objective 6: The student will cut internal threads as per specifications.
*Objective 7: The student will tap a blind hole as per specifications.

*Indicates core/essential objectives

Performance Record: Place a check by each objective the student achieved:

____ *1. Turned between centers.
____ *2. Turned a taper.
____ *3. Performed boring operations.
____ *4. Cut external threads.
____ *5. Picked up threads.
____ *6. Cut internal threads.
____ *7. Tapped a blind hole.

*Indicates core/essential objectives

COURSE: Machine Tool Operation II/Machine Shop II

Unit 5: Advanced Milling Operations

Objectives: Upon completion of this unit, the student will:

*1. Mill a key seat.
*2. Mill an angle.
*3. Perform a boring operation.

*Indicates core/essential objectives

Suggested Instructional Practices:

Lecture-discussion
Laboratory demonstration and practice

Suggested Resources:

Primary Resource: Dunn, James. Machine Shop Milling Machines. Stillwater, OK: Oklahoma State Department of Vocational and Technical Education. 1983.

Evaluation and Suggested Minimum Performance Standards:

*Objective 1: The student will mill a key seat to specifications and tolerances.
*Objective 2: The student will mill an angle to specifications and tolerances.
*Objective 3: The student will perform a boring operation to specifications and tolerances.

*Indicates core/essential objectives

Performance Record: Place a check by each objective the student achieved:

____ *1. Milled a key seat.
____ *2. Milled an angle.
____ *3. Performed a boring operation.

*Indicates core/essential objectives

COURSE: Machine Tool Operation II/Machine Shop II

Unit 6: Grinding Machines

Objectives: Upon completion of this unit, the student will:

*1. Define grinding machine operations.
*2. Identify different types of grinding wheels and state their applications.
*3. List reasons for truing and balancing grinding wheels.
*4. Identify the major parts of a surface grinder and state their functions.
*5. State rules of grinding machine safety.
*6. Set up a grinding machine and operate its controls properly.

*Indicates core/essential objectives

Suggested Instructional Practices:

Lecture-discussion
Laboratory demonstration and practice

Suggested Resources:

Primary Resource: Dunn, James. Machine Shop Grinding Machines. Stillwater, OK: Oklahoma State Department of Vocational and Technical Education. 1983.

Evaluation and Suggested Minimum Performance Standards:

*Objective 1: The student will define four grinding machine operations.
*Objective 2: The student will identify four different types of grinding wheels and state their applications.
*Objective 3: The student will list four reasons for truing and balancing grinding wheels.
*Objective 4: The student will identify 12 major parts of a surface grinder and state their function(s).
*Objective 5: The student will state 12 rules of grinding machine safety.
*Objective 6: The student will set up a grinding machine for surface grinding and operate its controls following manufacturer's specifications and procedures.

*Indicates core/essential objectives

Performance Record: Place a check by each objective the student achieved:

____ *1. Defined grinding machine operations.
____ *2. Identified different types of grinding wheels and stated their applications.
____ *3. Listed reasons for truing and balancing grinding wheels.
____ *4. Identified the major parts of a surface grinder and stated their functions.
____ *5. Stated rules of grinding machine safety.
____ *6. Set up a grinding machine and operated its controls properly.

*Indicates core/essential objectives

COURSE: Machine Tool Operation II/Machine Shop II

Unit 7: Grinding Machine Operations

Objectives: Upon completion of this unit, the student will:

*1. Dress a wheel flat.
*2. Grind a piece flat and parallel.
*3. Grind a work piece to a specific dimension.

*Indicates core/essential objectives

Suggested Instructional Practices:

Lecture-discussion
Laboratory demonstration and practice

Suggested Resources:

Primary Resource: Dunn, James. Machine Shop Grinding Machines. Stillwater, OK: Oklahoma State Department of Vocational and Technical Education. 1983.

Evaluation and Suggested Minimum Performance Standards:

*Objective 1: The student will dress a grinding wheel flat.
*Objective 2: The student will grind a piece flat and parallel.
*Objective 3: The student will grind a work piece to a specific dimension and tolerance.

*Indicates core/essential objectives

Performance Record: Place a check by each objective the student achieved:

____ *1. Dressed a wheel flat.
____ *2. Ground a piece flat and parallel.
____ *3. Ground a work piece to a specific dimension.

*Indicates core/essential objectives

COURSE: Machine Tool Operation II/Machine Shop II

Unit 8: Project Construction

Objectives: Upon completion of this unit, the student will:

*1. Lay out and construct a project.

*Indicates core/essential objectives

Suggested Instructional Practices:

Laboratory demonstration and practice

Suggested Resources:

(Note: Several project plan books are available from various sources. The choice of a specific project or projects for this unit is left to the discretion of the instructor.)

Evaluation and Suggested Minimum Performance Standards:

*Objective 1: Using a teacher selected set of blueprints, the student will lay out and construct a project to specifications and tolerances from raw materials using at least three different machines and appropriate hand and bench tools.

*Indicates core/essential objectives

Performance Record: Place a check by each objective the student achieved:

____ *1. Laid out and constructed a project.

*Indicates core/essential objectives

COURSE: Machine Tool Operation II/Machine Shop II

Unit 9: Computerized Numerical Control

Objectives: Upon completion of this unit, the student will:

*1. Describe computerized numerical control (CNC) operations.
*2. Describe the codes used in a CNC machine.
*3. Write a program for a CNC machine.
*4. Execute the program on a CNC machine.

*Indicates core/essential objectives

Suggested Instructional Practices:

Lecture-discussion
Laboratory demonstration and practice

Suggested Resources:

Primary Resource: Selection of the primary reference for this unit will be dependent upon the type of CNC machine which will be used by the instructor.

Evaluation and Suggested Minimum Performance Standards:

Specific performance standards for objectives 1-4 of this unit must be developed at the local level. These standards will be dependent upon the type of CNC machine used at the local level.

Performance Record: Place a check by each objective the student achieved:

____ *1. Described computerized numerical control (CNC) operations.
____ *2. Described the codes used in a CNC machine.
____ *3. Wrote a program for a CNC machine.
____ *4. Executed the program on a CNC machine.

*Indicates core/essential objectives

STUDENT PERFORMANCE RECORD

MACHINE TOOL OPERATION/MACHINE SHOP

MACHINE TOOL OPERATION I/MACHINE SHOP I

Student: _____

This record is provided as an alternative to the student performance records at the end of each unit. It can be duplicated for each student and serve as a cumulative record of competencies achieved in the course.

Place a check by each objective the student achieved; you may wish to note the date that the student achieved the objective.

C = Core competencies

____ 1. Identified local school rules, policies, and operational procedures associated with machine tool operation programs.
____ C2. Identified rules of general and personal shop safety.
____ C3. Performed mathematical operations using fractions.
____ C4. Performed mathematical operations using decimal numbers.
____ C5. Read a rule.
____ C6. Identified common types of micrometers and their uses.
____ 7. Stated rules for use and care of micrometers.
____ C8. Made and read a measurement with a micrometer.
____ C9. Made and read a measurement with a vernier caliper.
____ 10. Stated rules for use and care of dial indicators.
____ 11. Used a dial indicator to align a vise with swivel base.
____C12. Used a dial indicator to align work in a 4-jaw chuck.
____C13. Identified general hand tools associated with machine tool operation.
____C14. Stated rules which apply to the safe use of hand tools.
____C15. Determined the tap drill size using a chart or a formula.
____C16. Produced internal threads by hand tapping.
____C17. Produced external threads with a hand die.
____C18. Stated rules which apply to safe use of a pedestal grinder.
____C19. Checked a grinding wheel for cracks.
____C20. Dressed a grinding wheel.
____C21. Ground a high speed tool bit.
____ 22. Identified the types of power saws used in machine tool operations.
____C23. Stated rules for safe use of power saws.
____ 24. Listed factors that determine blade selection.
____C25. Cut stock with a horizontal band saw.
____C26. Cut stock with a vertical band saw.
____ 27. Identified the different types of drill presses.
____C28. Identified operations performed on a drill press.
____C29. Listed rules for safe use of drill presses.
____C30. Listed factors that determine cutting speeds for drilling.
____C31. Drilled and reamed holes to layout.
____C32. Identified symbols used on blueprints.
____C33. Identified abbreviations used on blueprints.
____C34. Identified the alphabet of lines.

____C35. Defined dimension and tolerance.
____ 36. Listed types of information found in a blueprint title block.
____C37. Read an industrial blueprint.
____C38. Identified major parts and sub-parts of an engine lathe.
____C39. Listed rules for safe use of the engine lathe.
____C40. Listed rules for the care and cleaning of the engine lathe.
____C41. Described basic lathe operations.
____C42. Free-hand ground a turning tool.
____C43. Free-hand ground a facing tool.
____C44. Set up a lathe and operated lathe controls.
____C45. Removed and installed a lathe chuck.
____C46. Performed a facing operation.
____C47. Faced a part to length.
____C48. Performed a straight turning operation.
____C49. Used a dial indicator to align a 4-jaw chuck.
____C50. Performed chamfer operations.
____C51. Performed a center drilling operation.
____C52. Performed a knurling operation.
____C53. Performed a cutoff operation.
____C54. Identified different types of milling machines.
____C55. Identified major parts of a vertical mill.
____C56. Identified cutting tools used on vertical milling machines.
____C57. Stated rules for milling machine safety.
____C58. Cleaned and lubricated a vertical mill.
____C59. Identified vertical milling machine operations.
____C60. Set up a vertical milling machine.
____C61. Performed a side milling operation.
____C62. Performed an end milling operation.
____C63. Performed a fly cut operation.

MACHINE TOOL OPERATION II/MACHINE SHOP II

Student: _____

This record is provided as an alternative to the student performance records at the end of each unit. It can be duplicated for each student and serve as a cumulative record of competencies achieved in the course.

Place a check by each objective the student achieved; you may wish to note the date that the student achieved the objective.

C = Core competencies

____ 1. Identified local school rules, policies, and operational procedures associated with machine tool operation programs.
____ C2. Identified rules of general and personal shop safety.
____ C3. Identified tools and instruments used in layout.
____ C4. Performed a layout job.
____ C5. Turned between centers.
____ C6. Turned a taper.
____ C7. Performed boring operations.
____ C8. Cut external threads.
____ C9. Picked up threads.
____C10. Cut internal threads.
____C11. Tapped a blind hole.
____C12. Milled a key seat.
____C13. Milled an angle.
____C14. Performed a boring operation.
____C15. Defined grinding machine operations.
____C16. Identified different types of grinding wheels and stated their applications.
____C17. Listed reasons for truing and balancing grinding wheels.
____C18. Identified the major parts of a surface grinder and stated their functions.
____C19. Stated rules of grinding machine safety.
____C20. Set up a grinding machine and operated its controls properly.
____C21. Dressed a wheel flat.
____C22. Ground a piece flat and parallel.
____C23. Ground a work piece to a specific dimension.
____C24. Laid out and constructed a project.
____C25. Described computerized numerical control (CNC) operations.
____C26. Described the codes used in a CNC machine.
____C27. Wrote a program for a CNC machine.
____C28. Executed the program on a CNC machine.